# EXPERIMENTAL AND MODELING INVESTIGATION OF MASS TRANSFER DURING HOT AIR DRYING OF AHLAT PEAR

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| **ABSTRACT**  Drying is an energy-intensive process involving both heat and mass transfer, widely employed as a technique for preserving food [1]. Ahlat pear (Pyrus elaegrifolia L), naturally grown in Turkey and contains C and B vitamins, caroten, pectin, fruit acid, sugar and tannin. It can be consumed in dried or fresh form [2,3]. The main focus of this study is examining the efficacy of a cabinet dryer under diverse air temperatures (45, 55, and 65°C) with a consistent air velocity of 2 m/s in the drying process of Ahlat pears. The initial moisture content of Ahlat pears’ samples was successfully reduced from 68.75% to 20 % (wet basis), and a comprehensive analysis was made for their drying characteristics and kinetics. The impact of drying air temperature on drying time is clearly substantiated by the results. Drying curves illustrate a falling-rate period during the drying process without noticing any constant-rate period.  The study further elucidates the effective moisture diffusivity, evaluated via Fick's second law, revealing a range from 3.25×10-9 to 7.04×10-9 m²/s across the investigated conditions. Activation energy was estimated by a Arrhenius type equation as 35.51 kJ/mol. Five different mathematical models (Alibas, Aghbashlo, Logarithmic, Logistic, Page ve Henderson) were evaluated for moisture ratios using nonlinear regression analysis. The results of regression analysis indicated that the Alibas model is the best model to describe the drying behaviour with the lowest χ2 and RMSE values and highest R2 values.  **References:**  [1] Beigi, M. (2016). Energy efficiency and moisture diffusivity of apple slices during convective drying. *Food Science and Technology*, 36(1), 145-150.  [2] Ilhan, M., Akkol, E. K., Taştan, H., Dereli, F. T. G., & Tümen, I. (2019). Efficacy of Pyrus elaeagnifolia subsp. elaeagnifolia in acetic acid–induced colitis model. *Open Chemistry*, 17(1), 13-22.  [3] Yerliturk F.U., Arslan O., Sinan S., Gencer N., Ozensoy O. (2008). Characterization of polyphenoloxidase from wild pear (Pyrus elaegrifolia), *J. Food Biochem*., 32(3), 368-383. |

# Keywords: Hot-air drying, Ahlat pear, effective diffusivity, mathematical modelling, Alibas model.